

INSTITUTIONAL AND POLICY ANALYSIS OF RIVER BASIN MANAGEMENT

The Murray Darling River Basin, Australia¹

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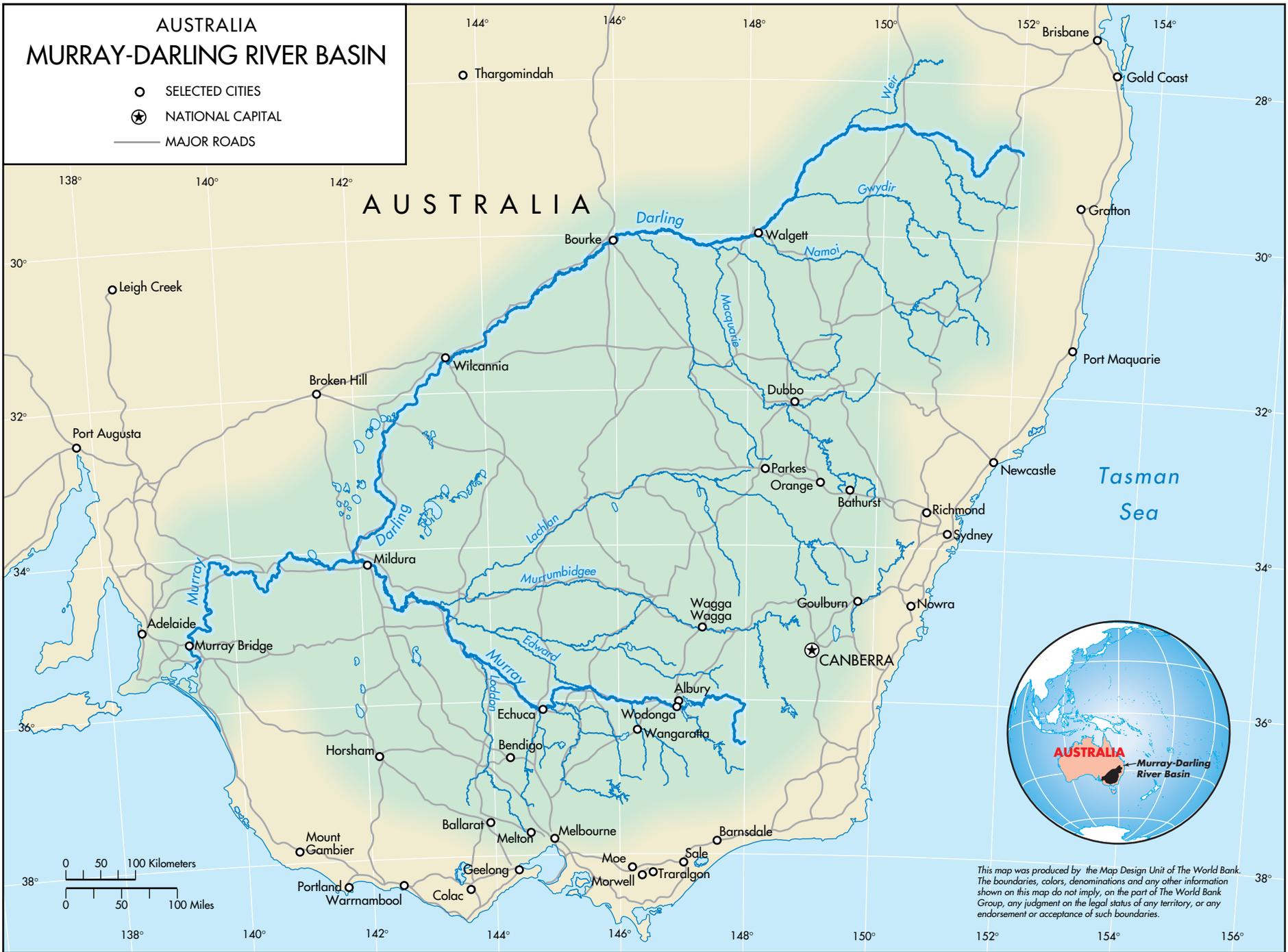
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AUSTRALIA MURRAY-DARLING RIVER BASIN

- SELECTED CITIES
- ★ NATIONAL CAPITAL
- MAJOR ROADS



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1. Background and Introduction

Integrated water resource management (IWRM) and organizing it primarily at the river basin level are two of the most common and widely repeated recommendations in the water resources literature of the last decade if not longer (Allee 1988; Galloway 1997; McDonald and Kay 1988; World Bank 1993). Basin management is often associated with the concept of decentralization, of managing water resources at the “lowest appropriate level.” (See, e.g., International Conference on Water and the Environment 1992; Mody 2001.) Several conceptual arguments have been presented in favor of decentralization in water resource management, and basin-level management in particular: that the whole array of resources and use patterns in the basin will be taken into account, public participation will be greater and broader, management decisions will be based on better knowledge of local conditions, and so on.

Empirical studies of river basin management systems provide opportunities to examine the claims made for basin-level integrated resources management, and to explore factors that appear to influence its implementation and outcomes. In this research project, with the support of the World Bank, the project team has searched for those factors and their relationships to river basin management in two ways: with a survey of river basin organizations throughout the world, and with case studies of eight river basins analyzed in greater detail. Some of those eight cases have emerged recently, as in the Warta River basin of Poland and the Fraser River basin of Canada. Others have long histories of basin-scale institutions, such as the Guadalquivir River basin in Spain and the Murray-Darling Basin in Australia.

This paper focuses on analysis of the evolution and current status of river basin management institutions in the Murray-Darling Basin. Only brief descriptions of the basin’s physical characteristics, social and economic profile, and historical development are included in this paper.

2. Analytical Framework

To analyze the data gathered for this project from the case studies and from the survey of river basin organizations, the project team has developed a framework that identifies a number of political and institutional factors which may be associated with the emergence, sustainability, and success or failure of decentralized approaches to integrated water resource management at the basin scale. These factors, and their hypothesized relationships with basin management in a country that has decentralized or is attempting to decentralize water resource management institutions, are derived from the institutional analysis literature relating to water or other natural resource management and to decentralized systems (especially Ostrom 1990, 1992; also Agrawal 2000; Alaerts 1999; Blomquist and Schlager 1999; Bromley 1999; Easter and Hearne 1993; Wunsch 1991).

Our information gathering and analysis focuses on the following sets of variables.

- Contextual factors and initial conditions
- Characteristics of the decentralization process
- Characteristics of central government/basin-level relationships and capacities
- The internal configuration of basin-level institutional arrangements

Variables considered within each set are listed in the appendix. The Murray-Darling Basin case is discussed in terms of these categories and variables in Section 8 below.

3. Methodology

We pursued a case study approach for this project in order to examine closely the processes of institutional change as well as the current situation. A site visit was facilitated by an expert and active participant in water policy and management who arranged interviews and prepared a background paper on the basin prior to the visit (Haisman 2003). Background papers for all case study visits are based on a common outline. During the site visit, team members met with and interviewed 20 individuals, including basin-level stakeholders, past and current central and local government officials, past and current Murray-Darling Basin Commission staff and members, and academic researchers with perspectives on government structure and water management in Australia.² The interviews were focused on understanding the processes of institutional origin and change and the performance of water management institutions at sub-basin, basin, state, and national scales, matters that were closely within the knowledge of the interviewees. After the visit, team members combined their notes from the interviews, revisited and revised the basin background paper, reviewed other materials, and composed this paper summarizing and analyzing the river basin management situation in the Murray-Darling Basin.

The following analysis of the Murray-Darling case is therefore based on a combination of sources—documentary materials on the basin and the various governmental and non-governmental organizations at work there, the background paper prepared for the visit, and the interviews conducted during the site visit. The findings and conclusions therefore do not represent the point of view of a single individual or organization, but emerge from a composite of data collected and reviewed by the research project team.

4. The Murray-Darling Basin

Water resources are a major public issue in Australia because of their scarcity and extreme variability. Although the coastal fringes are relatively well endowed with water, and are therefore where most of the population resides, the interior is arid and water is very scarce, making Australia the driest inhabited continent on Earth. The Murray-Darling Basin³ is an interior basin, taking its name from two dominant rivers, the Murray

² Organizations from which individuals were interviewed were the Department of Prime Minister and Cabinet, Government of Australia; Department of Agriculture, Fisheries and Forestry, Government of Australia; the Murray-Darling Basin Commission; Murray-Darling Basin Community Advisory Committee; River Murray Water; Department of Infrastructure, Planning, and Natural Resources, Government of New South Wales; Department of Sustainability and Environment, Government of Victoria; Albury Water; Goulburn Valley Water; Goulburn-Murray Water; Murray Irrigation Limited; Goulburn Broken Catchment Management Authority; Broken Catchment Committee; Australian National Committee on Irrigation and Drainage; Water Services Association of Australia; Victorian Water Industry Association; and Victorian Farmers Federation.

³ See map at the beginning of the paper.

and the Darling. It is defined by the catchment areas of the Murray and Darling Rivers and their many tributaries.

The Murray-Darling Basin lies to the west of the Great Dividing Range which runs the length of the east coast of Australia. The Basin extends across much of southeastern Australia, with the mouth of the Murray River on the southern coast of Australia near Adelaide. It includes over one million square kilometers, and about one-seventh of the land area of Australia. The Basin extends to over three-quarters of the State of New South Wales (NSW), more than half of State of Victoria, significant portions of the States of Queensland and South Australia and includes the whole of the Australian Capital Territory. Well over half of the Basin is in NSW and almost a quarter is in Queensland.

The Basin contains more than 20 major rivers as well as important groundwater systems. It is also an important source of freshwater for domestic consumption, agricultural production and industry.

The rivers of the Murray-Darling Basin are characterized by flat gradients (much of the basin is less than 200 meters above sea level), highly variable flows, and limited runoff. Average annual runoff is some 24 million cubic meters (m^3) of which around half is lost to natural processes. Total runoff is the lowest of any of the world's major basins and average annual flow to the sea is a mere 400 m^3 per second. Much of the Basin is semi-arid and some 86% of the area contributes no runoff. The Basin covers 14% of Australia but receives only 6.1% of Australia's mean annual runoff (Goss 2003: 1).

Wetlands systems play an important role for rivers in the Basin. There are about 30,000 wetlands in the Basin, with 11 being listed for their internationally significant environmental values. The wetlands are major considerations in environmental management of the rivers.

The water resources of the Basin are now highly developed. Annual diversions from the river system are 11.43 million m^3 , 96% of which is for irrigation (Goss 2003: 1). Total water storage capacity in the Basin is 34.7 million m^3 , which supports some 1,470,000 hectares of irrigated crops and pastures in the Basin (representing 71 percent of Australia's total area of irrigated crops and pastures).

In 1996 the Basin was home to nearly 2 million people (or about 11% of the total Australian population) and another million people outside the Basin were heavily dependent upon the Basin's water resources. The Basin boasts a gross value of production of over A\$23 billion, of which approximately A\$4.5 billion is generated by irrigated agriculture. Around 40 percent of Australia's gross value of agricultural production originates from the Murray-Darling Basin.

5. Basin Management Issues and Stakeholders

In light of the high degree of development of water use in the Basin, the dominant basin management issues of the 20th century were water scarcity, over-allocation of water supplies,⁴ and drought exposure. These issues stimulated the development of institutional arrangements in the Basin from the beginning of the 20th century to the 1990s. Those

⁴ Almost half of the Basin's surface water management areas are over-appropriated, i.e., authorized uses exceed mean annual flows.

institutions, summarized in the following section, provided for: the management of water distribution through the issuance of water use licenses; the allocation of Murray River flows among the States of South Australia, New South Wales, and Victoria; the construction and operation of water storage facilities to conserve and regulate river flows; and in the latter decades of the century, moratoriums on the issuance of water licenses, and ultimately a cap on diversions from the Murray-Darling system.

A second (though related) major Basin management issue is salinity. For climatological and geological reasons, much of Australia's soils store quantities of salt. In many irrigated areas, the application of water to the soil has elevated the concentration of salts in the underground water table and in surface water channels draining irrigated land. Compared with this irrigation-related salinity, however, a much larger and more difficult challenge is "dryland salinity." A European model of land clearing for agricultural development was followed in Australia in the late 19th and 20th centuries. It has been estimated that 15 billion trees, which used to transpire the saline water their roots drew from the aquifers, were removed from the Murray-Darling Basin alone. Saline groundwater levels in these areas have risen closer to the surface, sterilizing productive land in some places and boosting river salinities through surface runoff pathways. Currently it is estimated that 7 million hectares of Australia are affected by dryland salinity, and the National Land & Water Resources Audit projects that without intervention this will rise to around 17 million hectares by the year 2050.

There are other aspects of water quality deterioration in the Basin. Awareness of the impaired status of aquatic and riparian species and habitat in much of the Basin has risen since the 1970s and reached a level of concern in the outset of the 21st century that nearly matches that for water scarcity. In response to growing evidence of a decline in river health, the Murray-Darling Basin Commission sponsored work to bring together current studies and knowledge and to inform the debate on restoration of river health. The results (Norris et al 2001) showed, among other things, that:

- 38 percent of the river length assessed had biota that was significantly impaired;
- 10 per cent of the river length was found to be severely impaired, having lost at least 50 percent of the types of aquatic invertebrates expected to occur there;
- Over 95 percent of the river length assessed in the Murray-Darling Basin has an environmental condition that is degraded and 30 per cent is substantially modified from the original condition.

This has set the scene for what the Basin Commission has termed the Living Murray initiative, which is a concerted attack on the issue of failing river health of the Murray River. The States were already addressing environmental flows in other streams in the Basin, but were slower to address the Murray itself because its highly regulated nature as a transboundary river limits the options for modifying flows. Substantial reductions of water diversions for consumptive uses are expected to be necessary in order to achieve the meaningful ecological restoration envisioned by the Living Murray initiative. Currently, there is a major focus of debate in Australia concerning the need to recover a proportion of water now allocated to agriculture and to re-assign it to the

maintenance of river health.⁵ “The new competition for water is river health versus extraction of water for economic gain, and the nation is currently engaged in substantial debate on this issue within the Murray-Darling Basin” (Haisman 2003: 32).

In addition, the Murray-Darling Basin contains wetlands, lakes, and forests of substantial natural and cultural—even international—significance (Goss 2003: 1). The Macquarie Marshes are covered by the Ramsar Agreement on Wetlands of International Significance, to which Australia is a signatory. The first step of the Living Murray initiative is focused on the restoration of adequate water supplies for six “significant ecological assets” located along the Murray identified by the Murray-Darling Basin Ministerial Council: the Barmah-Millewa forest, the Gunbower and Koondrook-Perricoots forests, the Chowilla floodplain, the Hattah lakes, the River Murray channel, and the Murray Mouth including the Coorong and Lower lakes.

Thus, the current array of basin management issues in the Murray-Darling case includes water supply allocation, limiting water use, arresting and reversing water quality degradation, and restoring and protecting ecological values. Engaged with these issues are various stakeholders including

- irrigators and irrigation organizations such as irrigation associations, companies, districts, and trusts;
- water suppliers for urban and rural communities such as utilities, local government departments, and water companies;
- catchment management bodies representing community-based natural resource management interests at the sub-basin level;
- the states of South Australia, Victoria, New South Wales, and Queensland, plus the Australian Capital Territory (encompassing Canberra), with their respective ministers and departments relating to environment, agriculture, and natural resources; and
- the Commonwealth of Australia (the Australian national government) and its ministers and departments relating to environment, agriculture, and natural resources.

Section 7 will characterize the interests and motivations of these major stakeholders as well as other participants in the institutional arrangements for governing and managing the Murray-Darling Basin, but first it is necessary to connect these stakeholders and these basin management issues with the institutional arrangements that have been developed in the basin.

6. Institutional Arrangements for Basin Management

The institutional arrangements in the Murray-Darling Basin have evolved through three major stages:

⁵ Assuming the resumption of property rights from agriculture was accompanied by compensation payments, the total cost could be in excess of \$2 billion.

- an intergovernmental agreement allocating water flows of the Murray River and providing for the construction and operation of infrastructure on the River, benefitting the three states (South Australia, New South Wales, and Victoria);
- the extension of the scope and structure of the intergovernmental arrangements to the Darling River, as disputes among the States over river flows and water quality escalated, and unilateral state actions were implemented to restructure irrigation schemes and to limit water uses;
- the emergence of integrated water resource management in the Basin with new organizational structures and relationships at the sub-basin and basin scales, and with leadership and financial support from the national government as well as the State governments.

The history of the development of these arrangements is recounted in Haisman (2003), as well as others (e.g., Challen 2000, Goss 2003, Heinmiller 2004). Here the focus is on the current array of institutional arrangements in the Basin. Two tables follow, which attempt to summarize and portray the Murray-Darling Basin arrangements. Table 1 is arranged by organization—governmental levels (national, state, and local) and water management bodies (commissions, boards, authorities)—showing the water management functions of each.

Table 1. Water Management Functions in the Murray-Darling Basin, Australia

Body	Water Functions
National government (Commonwealth)	<p>Established by Constitution of 1901. The Commonwealth under its external affairs power can make decisions in relation to the environment – for example, as a signatory to an international agreement on the environment, the Commonwealth stopped the construction of the Franklin Dam in Tasmania. Another water function granted to the national government is in respect to navigation as part of interstate commerce. Otherwise, the Commonwealth does not manage either intrastate or interstate water uses or regulate water quality - these are functions of the States.</p> <p>In partnership with the States, the Commonwealth exercises some policy development and coordination functions through the Council of Australian Governments (COAG), and this has included setting a national water policy reform agenda (1994) and a National Water Initiative (2004).</p> <p>Commonwealth is an essential source of governmental funding for the States, which cannot impose customs or excise duties or income taxes. During World War II States also ceded their income taxing powers to the national government. The Commonwealth provides funds to the States that support the national interest in natural resource management functions. It also provides funds to sub-state water management entities such as catchment management boards or authorities.</p> <p>The Commonwealth is a party to the Murray-Darling Basin Agreement, participates on the Murray-Darling Basin Ministerial Council and the Murray-Darling Basin Commission, and provides a significant portion of the funding for the Commission and its activities in the Basin.</p> <p>Where Commonwealth and State powers/legislation overlap, the Commonwealth takes precedence.</p>

State governments	<p>Full sovereign powers over land, water and natural resources.</p> <p>State law typically vests authority for the control and use of water in a ministry. This Ministry is responsible for water rights systems etc.</p> <p>Built and still owns and operates major dams on rivers. Initially built and operated irrigation schemes, although with the exception of Victoria, these are now all privatized.</p> <p>Oversees, and to some degree finances, water supply and sanitation functions of Local Governments.</p>
Territory governments	<p>The Constitution allows the Commonwealth to make laws on any subject for Territories ‘surrendered’ by the States or acquired by the Commonwealth. The Commonwealth has conferred a large measure of self government on three of the Territories, namely the Australian Capital Territory, Norfolk Island and the Northern Territory.</p>
Local governments (urban and rural)	<p>Established and authorized by state legislation. Provide and operate water supply and sanitation infrastructure, with state government financial assistance in many circumstances. (Rural domestic water supply systems are rare, though, with landholders generally responsible for their own water supply).</p> <p>Flood protection, with state financial assistance and in adherence to state standards for flood protection works.</p>
Murray-Darling Basin Ministerial Council	<p>Composed of ministers from the State and Commonwealth governments and a representative from the Australian Capital Territory, it is the policy making body for the Murray-Darling Basin under the provisions of the 1992 Murray-Darling Basin Agreement. This Agreement has the force of law, by virtue of having been enacted as a law within each participating jurisdiction. The Council takes a consensus approach in order to achieve unanimous agreement on actions (participating governments each have an effective veto).</p>
Murray-Darling Basin Commission	<p>The Commission is the executive body for implementing Council’s decisions on Basin policy and management. It also advises the Ministerial Council on Basin conditions and concerns. The Commission consists of representatives from each Basin government and is supported by staff and operations are funded under the cooperative agreement among the participating governments, (i.e. the States, the Commonwealth, and the ACT).</p>
Murray-Darling Basin Community Advisory Committee (CAC)	<p>This body advises the Ministerial Council, representing the interests and concerns of local communities and stakeholder groups throughout the basin. On major policy issues, the Ministerial Council typically receives two reports—one from the Commission and one from the CAC.</p>
River Murray Water	<p>A “ring-fenced” business operation of the Murray-Darling Basin Commission, River Murray Water controls the flows of the transboundary Murray River as a bulk supplier, operating infrastructure facilities on the main stem of the river to assure the States of New South Wales, Victoria, and South Australia of their flows under provisions of the 1914 River Murray Water Agreement as amended.</p>
Catchment Management Boards/	<p>Carrying slightly different titles from one State to another, these are mostly coordinating and advisory sub-basin and sub-State bodies with responsibility for protecting water quality and riparian and floodplain</p>

Committees/ Authorities	conditions through efforts to improve land stewardship and through actions such as riverbank protection projects and tree-planting.
Water Management Committees	These are community-based advisory committees composed primarily of water users; in some instances they are components of the Catchment Management Committees. They advise on water allocations, environmental flows, and in some cases flood protection, river facility operations, and/or water pricing. Board membership is heavily weighted to community representation.
Rural Water Authorities (Victoria only)	These are governmental, corporatized water suppliers managing all aspects of bulk water provision for municipalities and operating irrigation schemes (including major dams off the main stem of the Murray). They are virtually self-sufficient financially and set their own water prices.
Irrigation companies	These are the fully privatized bodies operating in all States but Victoria, to which previously governmental irrigation infrastructure assets and operations have been transferred. They are subject to corporations law, and stand alone in all respects financially.
Water user groups	These have been around for decades, and take multiple forms. Nearly every river has at least one. Though none have formal powers, some are quite influential. They receive some assistance from state governments because they play an important role in community participation, and in some instances even perform duties that would otherwise have to be performed by government—e.g., creating a roster of water users and uses on an otherwise unregulated river.

To capture some of the key ways in which institutional arrangements in the Basin shifted since the 1980s, Table 2 maps the organizational arrangements in the Murray-Darling Basin differently, by function. For each function listed in the cells of the left column, the corresponding cells of the other columns illustrate pre- and post-1980 organizational structures, stakeholder consultation practices, and financing arrangements. Because states can assign and organize responsibilities differently, and since listing the arrangements in each of the four states plus the Australian Capital Territory would make the table excessively complicated and tedious, Table 2 concentrates on the two largest states in the basin, New South Wales and Victoria.

Table 2. Functions in New South Wales and Victoria, Pre- and Post-1980 (see note at the bottom of the table)

Function	New South Wales		Victoria	
	Pre - 1980	Current	Pre - 1980	Current
Water resource management	All done from Sydney. No staff located in country. <i>All valleys had appointed water user advisory committees.</i> <u>No costs recovered</u>	Only policy and some technical specialists in Sydney. Others in country under Regional Directors. Water sharing plans prepared by water management committees.	All done from Melbourne. No staff located in country. <i>All valleys had appointed water user advisory</i>	Only policy and some technical specialists in Melbourne. Other work is split between regional offices or ‘outsourced’ to Rural Water Authorities. <i>Catchment Management Councils</i>

	<p><u>other than admin – eg licence fees</u></p>	<p><i>State-wide Water Advisory Council reports to Minister. Water Mgmt Committees operate under Catchment Management Boards</i></p> <p><u>Water pricing subject to Independent Pricing and Regulatory Tribunal (IPART). WRM costs recognized above O+M and renewals costs on impactor-pays basis.</u></p>	<p><i>committees.</i></p> <p><u>No costs recovered other than admin – eg licence fees.</u></p>	<p><i>and Rural Water Authorities have Board and Water Service Committees for stakeholder input and decision-making.</i></p> <p><u>Regarded as public good and is funded by government.</u></p>
Headworks management	<p>All site staff controlled from Sydney.</p> <p><i>Nil.</i></p> <p><u>No costs recovered.</u></p>	<p>‘State Water’ formed as internal ring-fenced business to manage headworks. Site staff and operations under Regional Directors, but centralized policy and standards.</p> <p><i>State Water has Customer Service Committees in each valley.</i></p> <p><u>IPART has set price path to full cost recovery by June 2004.</u></p>	<p>All site staff controlled from Melbourne.</p> <p><i>Nil.</i></p> <p><u>No costs recovered.</u></p>	<p>Fully transferred to autonomous Rural Water Authorities.</p> <p><i>Rural Water Authorities have Board and Water Service Committees for stakeholder input and decision-making.</i></p> <p><u>Full recovery of O+M and renewals. Initial limited capital grants by govt for compliance costs – eg dam safety.</u></p>
Irrigation scheme management	<p>All operations and maintenance (O&M) staff working in accord with Sydney-sourced standards.</p> <p><i>All schemes had appointed water</i></p>	<p>Fully privatized; only state mgmt is through bulk water licenses and discharge licenses.</p> <p><i>All are now user-owned and operated.</i></p>	<p>All O&M staff working in accord with Melbourne-sourced standards.</p> <p><i>All schemes had appointed</i></p>	<p>Fully transferred to autonomous Rural Water Authorities.</p> <p><i>Each scheme has a water-user based Water Services Committee that oversees O&M,</i></p>

	<p><i>user advisory committees.</i></p> <p><u>Limited recovery of O+M costs.</u></p>	<p><u>Privatized schemes are self-sufficient, but are receiving for up to 10 years capital grants from government in recognition of deferred rehabilitation works.</u></p>	<p><i>water user advisory committees.</i></p> <p><u>Limited recovery of O+M costs</u></p>	<p><i>budgeting and pricing</i></p> <p><u>Rural Water Authorities are self-sufficient.</u></p>
Urban water supply	<p>A function of local government. Financial and technical assistance from State.</p> <p><i>Limited, other than normal council processes.</i></p> <p><u>Pricing based on property taxes. Cross-subsidies common.</u></p>	<p>Water businesses of local government operating in ring-fenced fashion.</p> <p><i>Consultation now common.</i></p> <p><u>Pricing based on metered supplies. Cross-subsidies removed.</u></p>	<p>A function of specifically created local authorities.</p> <p><i>Limited, other than normal council processes.</i></p> <p><u>Pricing based largely on property taxes. Cross-subsidies common.</u></p>	<p>Local authorities disbanded in favor of smaller number of urban water supply state-owned corporations.</p> <p><i>Consultation now common.</i></p> <p><u>Pricing based on metered supplies. Cross-subsidies removed. Urban water authorities expected to pay a dividend to government.</u></p>
Floodplain management	<p>A function of local government. Financial and technical assistance from State.</p> <p><i>Limited, other than normal council processes.</i></p> <p><u>Owners of levees pay a license fee. Costs of local government programs covered in general property taxes plus State grants.</u></p>	<p>No substantial change.</p> <p><i>Extensive consultation now common.</i></p> <p><u>Levee fees still apply. Attempts by local government to ring-fence where feasible. State grants continue.</u></p>	<p>Mostly a function of specially created local authorities.</p> <p><i>Limited, other than normal council processes.</i></p> <p><u>Owners of levees pay a license fee. Costs of local government programs covered in general property taxes plus State grants.</u></p>	<p>Now transferred to Catchment Management Authorities.</p> <p><i>Consultation and partnerships part of normal Catchment Management Authorities' processes.</i></p> <p><u>Levee fees still apply. Catchment Management Authorities' programs transparent. Property taxes started but rescinded.</u></p>

Note:

Policy-making and implementation authority appears in regular font.

Stakeholder or public consultation appears in italics.

Financing appears underlined.

Four key contextual elements are important in understanding these arrangements more fully.

1. *Australian federalism and the sovereign role of the States*—Basin management has evolved and been organized in the Murray-Darling case in ways that distinctly reflect the nature of Australia’s federal constitutional arrangements. As noted briefly in Table 1, the Australian constitution devolves nearly all domestic policy matters to the states, with very limited authority for the commonwealth, or national government. This is essential to bear in mind, in order to understand that although there have been elements of river management in the Murray-Darling Basin for nearly a century, management organizations and functions there have never been unified on the river basin scale or uniform across states. Water use licenses in the Basin are not granted by the Murray-Darling Basin Commission or any other basin-scale organization, but by each state or territory. The same is true of water discharge licenses. The same is true of the creation and authorization of all forms of sub-basin organizations such as water management committees, catchment management bodies, irrigation companies, so that each state in the Basin contains a different combination of water management organizations. The policy-making body for the Basin—the Murray-Darling Basin Ministerial Council—operates with a unanimity rule such that each state (and the Commonwealth) can block basin policy with which it disagrees by withholding its assent.
2. *Restructuring of sub-basin organizations and state and national ministries*—Prompted by substantial fiscal problems in the late 1970s and early 1980s, and informed by a variety of viewpoints (including the rise of Thatcherism in Britain), the states undertook a very thorough examination and reorganization of water provision and water management operations in the 1980s. The essence of the reorganizations was this: publicly provided services for which fees could be collected should be either corporatized (turned into governmental bodies that were financially self-sufficient—“ring fenced”—by performing services for fees and maintaining their own assets) or fully privatized. States and territories were encouraged to undertake such reforms by the Commonwealth government, which offered financial incentives (tranche payments) for the adoption of measures consistent with an initiative known as the National Competition Policy intended to improve public-sector efficiency in Australia. As noted in Table 2, states such as Victoria and New South Wales changed the organization and financing of functions such as headworks operation, bulk water supply for irrigation or municipalities, delivery of urban water services. Even the operation of the infrastructure assets on the Murray River stem was turned over to a ring-fenced entity within the Commission, known as River Murray Water (see Table 1). These changes are important not only in their own right (since they have assisted in the transition to water pricing and cost recovery practices more nearly

consistent with contemporary principles), but also because they facilitated a round of other changes to state ministries and commonwealth departments. Once the construction, operation, and maintenance of infrastructure and the provision of services such as water supply had been removed from state or commonwealth-level departments of water resources (leaving them largely with planning and regulatory functions), a next step in most states and at the commonwealth level was the combining of water resource departments or ministries with other natural resource or environmental departments that encompassed portfolios such as agriculture, land use planning, forestry, and fisheries. Although by no means smooth and seamless, it does appear that these changes at the department and ministry level have facilitated a policy shift toward integrated resource management that takes into account the interactive effects of land development and use with water quality with riverine species and habitat or other aspects of natural resources. On a political level, such changes also attenuated the relationship between water agencies and traditional water constituencies (such as irrigators), making it easier for water planners and policymakers to contemplate and ultimately enact changes such as capping water diversions for the sake of protecting environmental values.

3. *Emergence of national level leadership on water policy, with state consent*—Although the Commonwealth government itself lacks the constitutional authority to make and enforce water resource policy, national level policy leadership in Australia (with respect to water and several other issues) has grown substantially over the past half century, and especially during the 1990s and 2000s. The seeds of this change were sown in World War II, when the states surrendered their income taxing powers to the Commonwealth, which ever since has collected income taxes on a nationwide basis and distributed the revenue back to the states (and Territories). The Commonwealth's superior financial position has allowed it to accumulate some leverage with the otherwise sovereign States, by offering financial incentives to states to conform with policy directions approved by the Commonwealth. The National Competition Policy mentioned in the previous paragraph is an example. Another instrument of strengthened national-level policymaking is the Council of Australian Governments (COAG). COAG is the peak intergovernmental forum in Australia, comprising the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association (ALGA). COAG is a body that sets a national policy agenda for Australia. COAG's influence in the Murray-Darling Basin has been clear and profound, as the Council adopted in 1994 a National Water Policy Reform initiative, which it has revisited and revised in 2003-2004 and labeled the National Water Initiative (NWI). Key elements of the National Water Initiative are
 - As far as possible, separating resource management and regulatory roles of government from water service provision.
 - Greater local-level responsibility for water resource management.
 - Greater public education about water use and consultation in implementing water reforms.

- Research into water use efficiency technologies and related areas.
- Consumption-based volumetric pricing and full cost recovery for water services, with removal or transparency of cross-subsidies.
- New investments in irrigation schemes or extensions of existing ones are to be undertaken only being appraised for economic viability and ecological sustainability.
- State and territory governments are to implement comprehensive systems of water allocations or entitlements, which are to be backed by the separation of water property rights from land and include clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if appropriate, quality.
- The formal determination of water allocations or entitlements includes allocations for the environment as a legitimate user of water.
- Promotion of water trading (including across state and territory borders) of water allocations and entitlements to the extent feasible within the social or physical and ecological constraints of catchments.

State and territorial achievements in the enactment of these reforms could be rewarded by the Commonwealth with tranche payments.

4. *Renegotiation of the River Murray Agreement and its expansion into the Murray-Darling Basin Initiative*— In 1985 the three state governments and the national government began negotiations on a new agreement. In 1988 the Murray-Darling Basin Commission (MDBC) was formed under a new Murray-Darling Basin Agreement (MDBA) and took over this transboundary water management role plus took on a new responsibility for coordinating integrated catchment management across the whole basin. “The charter of the new agreement was ‘to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin.’” (Goss 2003: 2) Queensland and the Australian Capital Territory were integrated into the new arrangements, which included the three organizations mentioned in Table 1—the Murray-Darling Basin Ministerial Council (the political or policy-making body), the Murray-Darling Basin Commission (the administrative body), and the Community Advisory Committee (the community stakeholder consultative body).

With these contextual elements in place, and with the organizational and functional features arrayed in Tables 1 and 2, it is possible (albeit at a high level of generalization) to sum up the current state of policy and institutional arrangements in the Basin. As characterized by Goss (2003: 6):

Water management arrangements in the Murray-Darling Basin have evolved from a focus on managing rivers for water quantity and security of supply (to “drought-proof” agricultural development), to integrated catchment management designed to maintain both water quantity and water quality and better balance water use for human consumption with that required to maintain healthy riverine systems. Governments in the Murray-Darling have made a conscious effort over time to adapt their arrangements to address weaknesses in dealing with emerging issues such as water scarcity and salinity,

or to address instances where the arrangements have contributed to such resource degradation.

This transition is manifested in particular policy statements developed and adopted by the Murray-Darling Basin Ministerial Council. The Council's Natural Resource Management Strategy, adopted in 1990, explicitly embraced integrated catchment management as the basis for resource management in the Basin. The Ministerial Council and the Community Advisory Committee jointly adopted a further policy statement in 2001, "Integrated Catchment Management in the Murray-Darling Basin 2001-2010: Delivering a Sustainable Future," with which all Council strategies and actions are to be harmonized.

The states in turn have all established forms of decentralized catchment management bodies over the past 15–20 years, as noted in Table 1, creating bodies with a mandate to advise on all aspects of natural resource management. States have, however, balked at giving these bodies too much authority—in particular the power to raise their own funds through land taxes. The arguments against more autonomous catchment management authorities that are empowered to make management decisions and raise land taxes come down to:

- protests from landowners, especially farmers, about the cost imposed;
- concerns about creating a fourth tier of government; and
- opposition from local governments that fear encroachments upon their planning functions.

The states' reluctance to empower the catchment management bodies with autonomous revenue authority has to some degree been overcome by the national government's decision to disburse funds for natural resource management directly to properly constituted catchment management authorities under the National Action Plan for Salinity and Water Quality, and the Natural Heritage Trust programs.

As of 2004, the institutional arrangements for governing and managing the Murray-Darling Basin have been modified in substantial ways. The state governments and the Murray-Darling Basin organizations have been supplemented at the sub-basin level with catchment management bodies that are still developing their own role in land, water, and natural resource management. At the national level, the Council of Australian Governments and the Commonwealth government have become intensively involved in the development of national water policy reforms and initiatives that in some respects lead and in other respects follow the integrated water resource management direction taken during the 1990s by the Murray-Darling Basin Ministerial Council. COAG's latest set of proposals, published June 25, 2004, would push a number of reforms to water licensing, water trading, and the enhancement of environmental water flows along much further. The course of water policy reform and basin management in the Murray-Darling case thus reflects a combination of participants' motivations and institutional incentives and constraints.

7. Participants' Motivations, Incentives, and Actions

In the institutional arrangements for governing and managing the Murray-Darling Basin, there are several key participants or groups of participants. Some are key water user

groups, such as irrigators and urban water suppliers. Others are participants with formal roles in the Murray-Darling Basin institutional structure, such as the departments and ministries of the member States, the national government, and the Murray-Darling Basin Commission members and staff.

However measured, irrigation is a very large stakeholder group in the Murray-Darling Basin, but it is not a strictly homogenous group. Some irrigators are crop farmers (especially in New South Wales and Queensland) who have favored a fairly liberal granting of water licenses. They have been willing to accept less security and more variability in their water deliveries. On the other hand, there are irrigators with permanent plantings (orchards and vineyards, especially in South Australia and Victoria, also true to some extent of dairy farmers) with high capital investments. These irrigators have favored more restrictive granting of water licenses in order to maximize the security of water deliveries to license holders. On policy decisions such as state moratoria on granting licenses or the basin “cap” on diversions, these categories of irrigators had different interests—the former opposing and the latter generally supporting such decisions.

The irrigators have been more nearly united, however, in their opposition to the idea of real reductions in water licenses and diversions for environmental protection—for instance, as part of the “Living Murray” initiative. Irrigators with water licenses generally do not want them reduced or restricted from current levels in order to restore “river health,” which some regard as a rather abstract notion.

State and Commonwealth policy makers promoting the Living Murray initiative might be able to reduce irrigator resistance by offering expanded water trading, so that irrigators with insufficient water allocations might be able to acquire water from those with more than adequate allocations. Water trading is and has been allowed in each of the states on the River Murray—in South Australia since 1988, in Victoria since 1989, and in New South Wales since 1990.⁶ However, other institutional aspects of Murray-Darling water management have placed substantial limits on the scope of water trading. Since water licenses are issued by state governments, trading has been essentially limited to transactions taking place within a state. Furthermore, many water licenses are issued to schemes (irrigation districts, trusts, or companies) rather than to individuals, and in those cases trading among individuals depends upon the rules of the scheme rather than the rules of the state. In some schemes, shares or votes correspond with water allocations, and the rules of the scheme may restrict a user’s ability to trade water.

In order to overcome some of these barriers and expand the scope of water trading (thus perhaps reducing irrigators’ resistance to the Living Murray initiative), the Council of Australian Governments (COAG) in June 2004 proposed the elimination of restrictions on water trading across states, and further proposed the elimination of restrictions on water trades out of irrigation schemes (i.e., allowing a member of an irrigation scheme to sell or lease water entitlements to non-members) (COAG 2004). If enacted in law, these proposals would mark a significant step toward the creation of a basin-wide water trading marketplace.

In addition to bargaining for more flexibility (e.g., in the form of expanded water trading), irrigators have used their resistance to reduced water diversions to bargain for

⁶ Australia Farm News (n.d.) “Water Trading and Pricing.” [www.farmweb.au.com/h2o/h2use9.html], accessed 3 September 2004].

other concessions from state and Commonwealth governments. One is for permanent water entitlements, replacing water licenses of limited duration. In other words, irrigators have signaled a willingness to accept some reductions in water entitlement quantities in exchange for a lengthening of water license existence. COAG also supported this change in June 2004 (COAG 2004). Also, financial support for water-use efficiency improvements, infrastructure refurbishment, etc., and the perpetuation of some subsidies for agricultural water deliveries, has been a component of the political and financial price of implementing water use reductions.

Urban water suppliers in the Murray-Darling Basin appear to have moved closer to full cost recovery, and their rates have encouraged conservation by their customers. Thus the prospect of reduced water diversions does not alarm urban water suppliers to the same degree it does irrigators. Rather, urban suppliers' concern is with financial soundness—maintaining adequate revenues while per capita and per household “sales” of water decline. Further rate increases are only a partial solution—at some point in any locality, political pressure will build against further increases. River health is not necessarily a prime concern for urban suppliers, but they can accommodate it as long as it does not affect their financial situation adversely.

Another important set of participants in the Basin are the state ministries related to water and other natural resources. Their paramount interests appear to be (a) maintaining state autonomy, (b) receiving Commonwealth tranche payments for following or implementing national competition policy initiatives, and (c) protecting their constituents in negotiations concerning Basin policies. The combination of these motives leaves state ministries wanting to do enough to keep Commonwealth support flowing and to prevent encroachments on their autonomy, but not necessarily any more than that.

The reliance upon consensus as a decision rule in the Ministerial Council allows each state (and the Commonwealth) to block decisions or actions with which it disagrees. Another dimension of this consensus rule, however, may be that in order to overcome potential vetoes by each participating government, states and the Commonwealth have allowed one another to delay implementation of basin policy or follow a different practice. This is plainly seen with the cap on diversions, where the council agreed to the policy but Queensland and ACT have taken another five years without yet determining their cap amounts,⁷ and New South Wales has calculated its cap differently from Victoria or South Australia (in ways that make New South Wales appear not to be in violation of the cap). Such deviations from adoption or implementation of the “consensus” policy may be a pragmatic way of overcoming the obstacles to policy making ordinarily posed by a unanimity rule.

Commonwealth participants have interests of their own, too, of course. Among other things, each Commonwealth ministry that participates in the Murray-Darling structure is interested in keeping its own role and its own policy sector (e.g., agriculture, environment) represented in deliberations and free from encroachment by others—a sort of horizontal bureaucratic positioning. Equally intriguing, though, is the role of the Commonwealth governments as a whole, since a succession of them have sustained participation in, commitment to, and funding for the Murray-Darling institutions. Why would the Commonwealth sustain such commitments to a set of institutions where it is

⁷ The two states combined divert no more than 7% of total water diverted in the Basin, however, making their actions concerning the Cap less pressing.

basically treated as an equal with the states? Here too the Commonwealth's actions may be seen as a pragmatic option for addressing a combination of motives. On the one hand, the Murray-Darling Basin is economically and politically significant enough to warrant the national government's serious attention; on the other hand, that basin's situation is distinct and should not necessarily be the basis for nationwide policies that would apply to other basins in Australia with different circumstances. Having a basin-scale set of institutional arrangements in which the national government can participate, but which isolates decision making so decisions apply only to that basin, may satisfy the Commonwealth's combination of interests in this regard.

The Murray-Darling Basin Commission is another key participant in Basin policy making and implementation. Like any body, the Commission is able to enhance its influence on basin policy making by maximizing its resources (e.g., staff, budget), but in the particular context of the Murray-Darling Basin one of the commission's key strengths is as a non-partisan adviser. To maximize its legitimacy, the MDBC needs to provide support without perceived favoritism and bias, be the source of good "neutral science" and a source of sound advice on Basin policy questions. By performing these roles, the MDBC maintains the support of the states and Commonwealth. The commission staff are also interested in maintaining the commission's relative prominence in Basin policy making, and not having resource management issues devolved completely to state and substate actors.

Furthermore, Commission staff are heavily invested in the success of Basin management. MDBC is a premier basin organization worldwide, visited, studied, and copied by many. This prestige is likely a substantial motivator for Commission staff.

8. Applying the Analytical Framework

It is now possible to return to the analytical framework of Section 2 and review the factors identified there as potentially related to successful development of basin-scale decentralized institutional arrangements for integrated water resource management.

8.1 Initial Conditions and Contextual Factors

Initial conditions and contextual factors in the Murray-Darling were in most respects quite favorable to the development of new institutional arrangements leading toward integrated water resource management. The level of economic development in the basin and in Australia as a whole has made it possible for stakeholders and governments to invest time and money into knowledge generation, travel, meetings, and other tasks associated with the planning, negotiation, adoption and implementation of institutions for river basin management. There are few class, religious, or other socio-cultural distinctions keeping Australians throughout the basin from being able to establish communications, information sharing, or the making and keeping of agreements (where issues exist efforts are being made to resolve these – for example Indigenous Action Plans are being developed in relation to natural resources management in the Basin). Overall, the Murray-Darling Basin was quite favorable social and economic terrain for the development of Basin management institutions: its semi-arid climate makes water

issues significant enough to stimulate action, and the relative wealth and homogeneity of its population present few barriers to such action.

The initial distribution of resources among Basin stakeholders clearly has favored irrigators in the basin, who account for more than 90% of water diversions. This has not stymied the emergence of basin-scale institutions or the development of integrated water resource management, but it has slowed the pace of reforms such as licensing restrictions and cost-recovery pricing, with the latter driven more by national economic policy reforms than by internal basin-scale reform efforts. Indeed, national reform efforts articulated through COAG have provided helpful leverage to policy actors within the Murray-Darling basin trying to enact and implement restrictions on water diversions and the reduction of agricultural water subsidies. Current reform efforts oriented toward implementation of the Living Murray initiative have entailed several concessions toward irrigation interests, as noted in Section 7 above. Thus, irrigators' position has affected the shape and speed of institutional reform in the Murray-Darling basin.

8.2 Characteristics of the Decentralization Process

If anything, the construction of basin management institutions and policies in the Murray-Darling basin has been as much or more a matter of integration as it has been decentralization. Concerns that might arise in other countries about the ability or willingness of the central government to genuinely devolve decision making authority are of little consequence in Australia, where primary decision making authority predominantly and initially rested at the sub-basin level with the state governments. Over time, and with the cooperation and consent of the national government, the states have constructed intergovernmental arrangements to control and operate Murray River flows and then to address other issues.

Central-level recognition of Basin governance and management has been complete and consistent. The Commonwealth government not only recognizes, but participates in and helps to fund, the Basin-scale organizations such as the Ministerial Council and the Commission. Through financial incentives offered to the states and to substate catchment management authorities, and through establishment of and participation in bodies such as the Council of Australian Governments, the national government has actively encouraged the development of integrated water resource management in the Murray-Darling Basin. These commitments from the national government have remained consistent across elections and changes in party control.

8.3 Central-Local Relationships and Capacities

Only two of the factors in this component of the analytical framework are less than favorable to successful integrated water management at the basin level. One is the past and current system of water rights. As noted already, entitlements to the use of water are not issued by any basin-scale or larger entity, but by each state and there are differences and similarities among the states' rules governing water entitlements (e.g., with respect to duration, security, and transferability). Rights generally fall into three categories: licenses issued to organizations such as irrigation companies, trusts, or districts, licenses issued to individuals, and rights of riparian landowners. Each state has arguably over-

allocated water licenses as it responded to economic development pressures to expand agricultural production and facilitate community growth, and this over-allocation now represents one of the principal challenges of basin management in the Murray-Darling case. Groundwater still has uncertain status in the water licensing arrangements of the states in the Murray-Darling Basin and has not been fully integrated into the licensing system. Overall, then, the systems of water entitlements in the basin continue to require further reform if measures such as water trading and the protection of environmental flows are to be implemented fully in the Murray-Darling case.

Also, the organizations in the Basin most directly associated with integrated resource management (eg., the sub-basin catchment management authorities) have virtually no financial resources of their own and are for all practical concerns completely dependent on funding contributed to them by the State and Commonwealth governments. There is nothing formally to prevent a future Commonwealth or State government from changing its policy and withdrawing its financial support. However unlikely this may be, it nevertheless represents an aspect of the institutional arrangements in the Murray-Darling case that our analytical framework would identify as a potential problem.

All other factors with respect to central and local (or basin-level) relationships and capacities are quite favorable to the successful and sustainable implementation of integrated water resource management in the Murray-Darling Basin case. Especially noteworthy is the basin management participants' ability to create and modify the institutional arrangements to meet their needs and circumstances. The States and the Commonwealth governments have amended and even completely replaced the agreements for the Murray River and the Murray-Darling Basin during their existence, and have reconstituted the basin governance arrangements to their current structure of Ministerial Council, Commission, and Community Advisory Committee. Furthermore, the participants retain the authority to make other changes in the future. Interviews with basin management participants indicated that issues of structure, capacity, and representativeness are contemplated and discussed on a recurring basis.

Another very favorable factor has been the extent of experience at the local and state levels with self-governance and service provision. A specific example here can help illustrate the advantageous position of the Murray-Darling Basin. Curtis, Schindler, and Wright (2002) have pointed out that the adoption of integrated catchment management approaches with active community participation was helped considerably by the existence of and experience with Landcare groups since 1986, and the provision of Commonwealth funding for improved land and other resource management practices through the Natural Heritage Trust program beginning in 1988. By the time the Murray-Darling Basin Ministerial Council adopted its Natural Resource Management Strategy in 1990, there were already numerous sub-basin groups addressing issues of improved land stewardship.⁸ Combining these landcare groups with the existence already of local

⁸ "By 1998, there were 900 Landcare groups operating across Victoria [alone] with an estimated membership of 27,500. In those areas where a Landcare group operated, about 46 percent of the rural properties had a Landcare member. Groups provide opportunities for learning by doing and through interaction with peers. Group processes have enabled participants to discuss conflicting views in a reasonable fashion and have generally enhanced social cohesion, increased the capacity of rural communities to attract resources from governments, and better equipped them to respond to change. With strong agency commitment to participatory processes, agency staff and Landcare members have established robust, productive partnerships and avoided many of the perils of co-option. Landcare participation has

government councils, irrigation trusts and districts, and rural water authorities (in Victoria), one finds that participatory catchment management has been introduced into a situation already rich with social and organizational capital.

8.4 Internal Basin-Level Institutional Arrangements

In this category of the analytical framework as in the others, most of the factors to consider point toward very favorable conditions for successful and sustainable development of integrated resource management at the basin level. There are basin-level governance organizations and sub-basin organizations, each with firm recognition and considerable support from the state and commonwealth governments. The states themselves are recognized as communities of interest within the river basin, as are a number of stakeholder communities represented on the Community Advisory Committee. Basin users and policy makers appear to have a rich array of means by which to negotiate and enter into agreement for committing and combining resources for projects and programs to improve basin conditions. Monitoring of Basin conditions is performed regularly and then consolidated into a Basin perspective by the Commission staff, in whom considerable confidence is voiced.

Two factors about the current institutional arrangements within the basin have less certain status—they are not necessarily negative, but they are less clearly positive. The clarity of institutional boundaries has been reduced somewhat by the introduction of the relatively new catchment management bodies. Local governments within the basin are not entirely certain how the land and water management activities of these bodies will overlap with traditional land use regulatory authority of local governments. Some basin-level staff seemed unsure how coordination will occur between the new bodies' water management activities and larger programs undertaken at the basin scale such as the Living Murray initiative. These uncertainties may prove to be nothing more than temporary adjustments as each organization gets used to its role and relationships with the others, or it may prove more difficult than that—at this moment it is impossible to predict.

Partly connected with this is the issue of conflict resolution arrangements. Arrangements exist and have been used to deal with conflicts between water users and conflicts between the states, but it is less clear how (meaning, by what process or through what body) conflicts would be addressed and resolved that arose between sub-state and sub-basin entities such as a local government and a catchment management body, or between catchment management bodies, or between a catchment management body and a rural water authority, etc. Here too the uncertainty and concern may prove to be only temporary and inconsequential, but it is too soon to tell.

also increased awareness of issues and enhanced landholder skills and knowledge and contributed to increased adoption of best management practices... Recent evaluations of the [Natural Heritage Trust] suggest that government investment has been more than matched by community contributions. Landcare participants are represented on regional [Catchment Management Committees] and other important fora and are contributing to important natural resource management decision making. By enhancing citizen competency, providing continuity of community representation, and acting as a place of retained knowledge, Landcare groups and their emerging networks appear likely to bridge the gap between the demands of adaptive management and the limitations of stakeholder participation.” (Curtis, Shindler, and Wright 2002: 1209).

9. Performance Assessment

A number of serious issues within the Murray-Darling River Basin have been identified, including water allocation (consumptive and environmental flows), water quality degradation (salinity and nutrients), and ecosystem health. These have been commonly recognized as interdependent, so a number of key programs have been adopted in inter-related fashion to address specific and general water resource problems.

- The Natural Resources Management Strategy (NRMS) was developed as an umbrella strategy to address many complex natural resource degradation issues on an integrated catchment management basis. The NRMS focuses upon investigation and education to strengthen the knowledge and skill base. The Integrated Catchment Management Policy Statement is a commitment by the community and governments of the MDB to do all that needs to be done to manage and use the resources of the Basin in a way that is ecologically sustainable. It includes all resources, land, water, and riverine environment.
- The Living Murray initiative discussed earlier involves a vision of a “...healthy River Murray system, sustaining communities and preserving unique values.” (MDMBC 2002, p.5) This seven-year program features principles of adaptive management based around annual and detailed reviews of river health. The Sustainable Rivers Audit will serve as a regular assessment of river health and ecological condition. This audit also includes performance indicators for macroinvertebrates, fishes, water quality, hydrology, and physical habitat.
- Steadily increasing diversions from the rivers of the Basin, raised concerns that basin water resources were allocated and that current levels of water use were unsustainable. The MDB Ministerial Council commissioned an audit of water use, which provided the first comprehensive assessment of basin-wide water use on a consistent basis. This revealed that median flow to the sea had been reduced 79 percent from natural conditions by the high levels of diversions and that rates of growth in water diversions increased since 1988. The Independent Audit Groups’ 2000-01 review of cap implementation (MDMBC 2002) indicates that transparency in reporting concerning cap compliance is resulting in pressure upon communities that are not in compliance, as well as their governments.⁹ The “Review of the Operation of the Cap” in 2002 concluded that the Cap is an essential first step in achieving a sustainable Basin ecosystem and that it has significantly reduced risk of environmental degradation.
- MDBC Salinity and Drainage Strategy arose from concerns about salinity and waterlogging problems along the Murray River with studies showing that the irrigation areas affected by high water tables could increase from 559,000 hectares in 1985 to 869,000 hectares in 2015 (MDBMC, 1987). Under the 15-year strategy, States agreed to be responsible for actions taken after 1 January 1988 significantly affecting river salinity. A market in salt credits was set up, a salinity audit was carried out and a model of salt loads and concentrations was

⁹ A region and its government are considered to be in breach of addressing water use overallocation or to not have commitment to cap compliance when breaching the cap several years running.

- developed along the main stem of the Murray River. End-of-valley salinity targets were adopted for each tributary catchment to be achieved by 2015 and joint salinity interception schemes agreed upon to manage existing saline inflows. This Strategy has largely been successful (MDBC 1999c) in stemming salinity caused by irrigation. However, dryland salinity has continued to threaten to river quality.
- Initial response to the growing awareness of the magnitude of the dryland salinity problem was the National Dryland Salinity Research, Development & Extension Program (NSDP) established jointly by the Commonwealth and State Governments in 1993. This Program is essentially a cooperative research effort to understand the nature of dryland salinity and to identify farm and other management practices that could either assist in remediation or, as a default option where nothing else will work, to identify productive uses of the saline landscape.
 - The National Action Plan for Salinity and Water Quality (NAP) is a partnership plan between communities (mostly as represented by their catchment management bodies) and government to fund and manage specific actions such as tree planting etc. The Commonwealth Government has pledged \$700 million to be matched by the States and Territories in a \$1,400 million program. The Plan, which builds on a number of existing programs, is an attempt to focus and coordinate national, regional and local efforts at managing dryland salinity and its consequences, including the salinization of rivers. It takes a targets and standards approach to natural resources management, implemented through community-based catchment planning and is augmented by research, incentives, governance and capacity building components of the Plan.
 - The development of a massive 1000 km algal bloom in 1991-92 in the Darling River prompted increasing concern regarding eutrophication in the basin. In 1994, the MDBC adopted the Algal Management Strategy to reduce the frequency and intensity of algal blooms and other water quality problems associated with nutrient pollution in the Murray Darling River Basin, through a framework of coordinated planning and management actions. Targets were established for phosphorus loads from the major subcatchments of the Basin to provide the framework for community catchment plans designed to reduce phosphorus. Other actions were focused on improved flow regimes, heightened community awareness, and improved scientific knowledge.

The MDBC and its stakeholders have shown commitment to understanding and taking proactive efforts to address critical issues in the basin through ongoing and reliable measurement, development of scientific knowledge, and an integrated and participatory approach - all expressed through basin- and sub-basin-scale initiatives. In addition to considering the strategies and programs the MDBC has developed to alleviate basin problems, performance of basin management institutions can be assessed under headings that reflect some desirable institutional characteristics of decentralized water resource management. These are Devolution of Authority; Stakeholder Participation; and Financial Self-Sufficiency. The following assessments are necessarily broad, as different states have taken somewhat different approaches.

9.1 Devolution of Authority

Water resource management is still driven by policy elites and audit groups in each State, but all actual management is carried out at regional levels in local offices with almost complete delegation for policy implementation including water sharing. Management and operation of dams and irrigation schemes has been transferred to entities designed for completely localized day to day management, and for financial sustainability. In all states but Victoria, this has included the privatization of irrigation schemes and their assets into the hands of the irrigators. Urban water and floodplain management have always been local responsibilities, albeit with some central technical and financial assistance, and this has continued and intensified in both technical and financial aspects.

9.2 Stakeholder Participation

All levels of water management are now supported by stakeholder advisory groups of one kind or another. This is complete in the case of privatized irrigation schemes where there is now no government involvement, but is also particularly well-developed for integrated catchment management. The basin population has nearly 20 years' experience in such community and government partnerships and brings a highly informed and sophisticated capability to the task. Public consultation is now the norm even for urban water and wastewater projects in a manner that simply did not exist 20 years ago.

9.3 Financial Self-Sufficiency

The national water reform agenda articulated in 1994, and couched in terms of a national competition policy, placed considerable emphasis on water management moving onto a sound financial footing. Economic elements of water reform policy required removal of cross-subsidies, consumption-based water pricing, new investments only if they were economically viable and ecologically sustainable, better specification of water entitlements, and the encouragement of water trading. These reforms were accompanied by institutional reforms that separated regulatory roles from service provision, required greater local-level responsibilities for management, and encouraged public education and consultation.

These reforms are advanced across the Basin. Generally, both urban and rural (irrigation) water supply infrastructure now gets no government funding for operations and maintenance and a very small and steadily decreasing amount of capital funding. The concept of a renewals annuity has been accepted as part of the pricing structure to ensure the long-run sustainability of the asset base.

9.4 Other Perspectives on Strengths and Weaknesses of the Institutional Arrangements in the Murray-Darling Case

Goss (2003) presents five criteria for sustainable river management: stable institutional organization formally recognized by means of a treaty, law, or agreement; a technical secretariat and stable funding; a sound knowledge base; integration; and transparency and community involvement. He finds the arrangements in the Murray-Darling to have been strengthened substantially with respect to each criterion since the 1980s. Chief among the achievements cited by Goss is the adoption of the Cap on Water Diversions, an agreement among the participants adopted by the Ministerial Council to arrest development of water use to 1994 levels, as a first step toward the restoration of river health.

Goss and others have, however, found some points of weakness in the Murray-Darling arrangements. These include:

- Frequent turnover of members on the Ministerial Council and on the Commission;
- The Murray-Darling Basin Commission lacks experts from outside government;
- The requirement of unanimity among Commission and Council members representing six governments, and for parliaments of all six governments to approve any changes to the Murray-Darling Basin Agreement, slows decision making.
- Lack of representation on the Community Advisory Committee by some key industries affected by basin management, and the fact that many representatives on the CAC are government appointments.
- While understanding of basin issues, policy, and projects is relatively strong among Council, Commission, and CAC members, “broader stakeholder understanding of Basin-wide natural resource issues, Council and Commission structures and decision-making processes and Council policy decisions is often poor.... The Commission is allocating considerably more resources to improve community participation in its current initiatives.” (Goss 2003: 4)
- Urban interests, rural towns, women, and Aboriginal interests have been underrepresented on Catchment Management Councils, at least in Victoria (Curtis, Shindler, and Wright 2002: 1211)
- Demand management in the growing urban areas will need the kind of attention and emphasis in the near future that water use restrictions for irrigation have had recently.

10. Conclusions

Management arrangements in the Murray-Darling Basin do not represent a simple template. They are complex, they have a history that has shaped their current structure and direction, and they are tailored to the particular circumstances of Australian federalism and the climate and topography and basin management issues there. While certain design elements might be transportable to other circumstances (a Community Advisory Committee, a funding formula, etc.), the overall structure has been crafted and modified over time to fit and adapt to this Basin.

Its fit, its complexity, and its adaptability are among its principal strengths, and help to explain the robustness of the Basin management institutions in the Murray-Darling case. As noted in the preceding section, there are weaknesses and criticisms to be made of the Murray-Darling arrangements, but its successes in gaining intergovernmental cooperation and commitment, instituting mechanisms for stakeholder participation, and generating a trusted body of data about basin problems and conditions are considerable.

Today, the individuals and organizations in the Murray-Darling Basin management structure stand on the threshold of a new era, in terms of organizational arrangements and policy direction. They are incorporating sub-basin catchment organizations into the framework for integrated water resource management, while leaving the basin-level organizations relatively unchanged for now. They are also attempting to achieve an ambitious portfolio of ecological restoration objectives, in addition to but distinct from their past focus on balancing water supply and demand for human consumption. And they undertake these efforts at a time when national-level bodies are becoming more actively involved in water policy, creating a national water policy framework into which the Murray-Darling will be expected to fit. Over the next decade, these challenges will test further the robustness of the institutions for river basin governance and management in the Murray-Darling Basin.

Acronyms

CAC	Community Advisory Committee
COAG	Council of Australian Governments
MDBA	Murray-Darling Basin Agreement
MDBC	Murray-Darling Basin Commission

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Appendix: Variables in the Analytical Framework

As noted in Section 2, the analytical framework used for this research project entails several variables hypothesized to be related to the success or failure of river basin management institutions, grouped into four categories.

Contextual factors and initial conditions

The literature on decentralized water resource management indicates that successful decentralization is at least partly a function of the initial conditions that prevail at the time a decentralization initiative is attempted. These initial conditions are elements of the social context of the decentralization effort. They include

- Economic development of the nation;
- Economic development of the basin area;
- Initial distribution of resources among basin stakeholders; and
- Class, religious, or other social/cultural distinctions among basin stakeholders.

Characteristics of the decentralization process

In countries that have attempted to decentralize water resource management to the basin level, characteristics of the decentralization process itself will affect the prospects for successful implementation. Two necessary conditions of a decentralization initiative are (a) devolution of authority and responsibility from the center, and (b) acceptance of that authority and responsibility by the local or regional units. Whether (a) and (b) occur will depend in part upon why and how the decentralization takes place. Important factors include

- Whether basin-level management was a local initiative to assume management responsibilities, a devolution that was mutually desired by local stakeholders and central government officials, or a decision by central government officials to shed water resource management responsibilities regardless of whether basin stakeholders wanted to assume them;
- The extent of central-government recognition of local-level basin governance; and,
- Whether central government officials maintained a policy commitment to decentralization and basin management through transitions in central government administration.

Characteristics of central government/basin-level relationships and capacities

Because successful decentralization requires complementary actions at the central government and local levels, other aspects of the central-local relationship can be expected to condition that success. Political and institutional variables should be

explored that relate to the respective capacities of the central government and the basin-level stakeholders, and the relationship between them. Key factors include

- The extent to which devolution of water management responsibilities from central government to basin institutions has been real or merely rhetorical, and whether devolution has been handled as a supportive transition to basin management or as an abrupt abandonment of central government authority;
- The financial resources available to basin-level institutions, and the extent of their financial autonomy;
- Basin management participants' ability to create and modify institutional arrangements that are tailored to their needs and circumstances;
- The extent of other experience at the local or regional level within the country with self-governance and service provision;
- The distribution (particularly asymmetries) of national-level political influence among basin stakeholders;
- Characteristics of the water rights system in the country which facilitate or hinder basin management efforts; and
- Whether basin-level institutions have had adequate time for implementation and adaptation of basin management activities.

The internal configuration of basin-level institutional arrangements

Successful implementation of decentralized water resource management will also depend on features of the basin-level arrangements created by stakeholders and/or central government officials. Important ones include

- The presence of basin-level governance institutions;
- The extent of clarity of institutional boundaries, and their match with basin boundaries;
- Whether and to what extent basin-level institutional arrangements recognize sub-watershed communities of interest;
- The availability of forums for information sharing and communication among basin stakeholders;
- The ability to make, monitor, and enforce contingent contracts whereby basin stakeholders can agree to contribute to improvements in basin conditions;
- The institutionalization of regular monitoring of basin conditions by means that are trusted by water users; and
- The availability of forums for conflict resolution.

Certainly, these factors will not all apply with equal significance in all cases. In each case, the emergence and path of river basin management will be affected profoundly by some of these variables, affected slightly by others, and not at all by some. Institutional analysis in a case-study setting consists largely in determining which institutional factors in what combination appear to have been linked to outcomes. Furthermore, many of the variables listed above have subjective components, and will be

assessed differently by different participants and observers. It is therefore essential in these case studies that team members interview individuals with a variety of perspectives.